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(Science of Polity)

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* Draft of a contribution for Dr Sankar Iyer's edited book on elephants in art, culture, literature and history.

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Elephants and Polity in Ancient India as Exemplified
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Abstract

After providing some background on the domestication and use of elephants in ancient India, this article concentrates on the role of the elephant in Indian statescraft as outlined in Kautilya's *Arthashastra*, reputed to have been written in the fourth century BC (over 2300 years ago). The body of this essay is presented as follows: first background on the nature of Kautilya's *Arthashastra* is provided and then his advice is outlined and discussed about the care of elephants. This care involves the duty of the King, the duties of the superintendent of elephants and the law relating to the treatment of elephants. Subsequently, Kautilya's views about the use of elephants in war are considered. The essay concludes with an overall assessment of the role of the elephant in the polity of ancient India as portrayed by Kautilya. It is argued that the high use value of elephants to ancient Indian rulers, especially in war, had a significant positive impact on the conservation of Asian wild elephants, and incidentally other wildlife in India as well. Today, the conservation of the Asian elephant depends mostly on its use for tourism and its non-use economic values which reflect human empathy with it and which are reinforced in India by social and cultural values.

Elephants and Polity in Ancient India as Exemplified

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1. Introduction

The elephant achieved a high status in public policy in ancient India as exemplified by the amount of coverage and central role given to it in Kautilya's *Arthashastra* (*Science of Polity*). Kautilya, chief minister to Maurya Chandragupta, is credited with having written this comprehensive work (or at least its basis) around 300 BC. It provides advice to the King on the governance of the state, how to live his personal life, and it gives guidance on politics, law, warfare, economics and morals. It provides recipes for advancement of the King and the state in this world. Elephants are afforded an important role in achieving this purpose as animals useful to the King in waging war and as beasts able to contribute substantially to transport and to economic production.

It is unclear when the elephant was first tamed in India (Daniel, 2004). Basham (1954, p.18), however, speculates that it may have already been domesticated by the Harrapa people and others in the Indus Valley Civilisation in pre-historical times (2500-1500 BC). There is even a suggestion (based on rock paintings) that it may have been domesticated in India as early as 6000 BC (Daniel, 2004, p.114). In any case, following the Aryan invasions of India commencing around 1500 BC, the elephant was already domesticated in the later Vedic age (probably as early as the 10th century BC) but according to Basham (1954, p.42), it was little used in war in this period. Nevertheless, at the time of the Mauryan Empire, commencing around 324 BC, the elephant had become a very important Indian instrument for conducting war. It had high use value as a means of transport, a beast of burden, a living bulldozer, and in war, it was a battering ram and had many of the properties of a modern army tank. Thus, the elephant was a very valuable resource in ancient India and continued to be until well into the first Millennium when modern technologies, introduced from Western countries, displaced the elephant in most of its uses.

At the beginning of the 21st century, the economic use value of the Asian elephant depended primarily on its use for tourism, its religious role in some ceremonies, and its part in pageants, zoos and circuses. There was and still is limited use for it in remote areas for snigging logs and loading lumber. However, its main economic value now stems from its non-use values arising from human empathy and respect for this animal, for example, the fact

that people highly value its continuing existence (existence value) and want others to enjoy its presence, including future generations (bequest value) (Tisdell and Bandara, 2004; Bandara and Tisdell, 2003). These values may also reflect feelings of social moral obligation to conserve the Asian elephant, in particular, and nature in general (Kotchen and Reiling, 2000; Passmore, 1974). Such a social and moral obligation is strong amongst followers of Hinduism and Buddhism, and has ancient cultural and historical roots. The total economic use value of the elephant is discussed in some detail by Swain (2004) with particular reference to Similipal, Orissa.

This essay is presented as follows: background on the nature of Kautilya's *Arthashastra* is presented, and then his advice is outlined and discussed about the care of elephants. This care involves the duty of the King, the duties of the superintendent of elephants and the law relating to the treatment of elephants. Subsequently, Kautilya's views about the use of elephants in war are considered. The essay concludes with an overall assessment of the role of the elephant in the polity of ancient India as portrayed by Kautilya.

2. Background to and Nature of Kautilya's Arthashastra

Kautilya, also known as Vishnugupta and Chanakaya, is reputed to have overthrown the last king of the Nanda dynasty and to have placed Maurya Chandragupta on the throne (Fleet, 1961) about 320 BC. He was subsequently chief minister to King Maurya Chandragupta and instrumental in the formation of the Mauryan Empire. Chandragupta captured most of northern India and was succeeded by his son Bindusara in 298 BC who in turn was succeeded by the renowned King Asoka who extended the empire so that it covered almost the entire Indian subcontinent. Asoka has been described as the greatest and noblest ruler India has known, and is indeed one of the great kings of the world (Basham, 1954, p.53). He was an efficient administrator, an Emperor who ruled on the basis of transparent codified laws, and just, according to Edwardes (1961, pp.47-48). In a sense, Kautilya, by placing Maurya Chandragupta on the throne, paved the way for the reign of Asoka and Kautilya's precepts of statescraft provided a foundation for Asoka's empire.

For many centuries, Kautilya's *Arthashastra* was lost. However, it was rediscovered early in the 1900s when the Pandit of the Tanjore District gave a copy that had been written on palm leaves to the Mysore Government Oriental Library. This was subsequently translated by Mr

R. Shamasastri with the 1st edition appearing in 1915 and the 7th edition in 1961 (Kautilya, 1961).

There is some dispute about how close this manuscript is to the original (Shamasastri, 1961). Some variations appear to have been incorporated in the Mysore copy as it was transcribed by scholars in order to preserve the original thoughts of Kautilya. Nevertheless, historians are agreed that it provides important insights into the social philosophy and statescraft of ancient Indian in the Mauryan period. For example, Basham (1954, pp.79-80) states: "... *Arthashastra* gives very detailed instructions on the control of the state, the organization of the national economy, and the conduct of war, and it is a most precious source-book for many aspects of ancient Indian life". Devahuti mentions that the extant Mysore copy of Kautilya's *Arthashastra* can be "ascribed to a date somewhere between the fourth century BC and AD 300 but most authorities are agreed that its political thought derives validity from Chandragupta Maurya's times, i.e. the fourth century BC" (Devahuti, 1970, p.120).

Although the title *Arthashastra* has been translated as the Science of Polity the word 'Artha' is not easily translated into English because it has a wide meaning in Sanskrit. Sometimes the title is translated as the *Science of Wealth*, and the *Science of Political Economy* would also seem to be an allowable translation. *Artha* is concerned with the pursuit of the entire material aspect of life (Devahuti, 1970, p.120).

Artha needs to be seen in the context of the ultimate Hindu aim of *moksha* – freedom as reintegration with the infinite. This can be attained as a result of appropriate pursuit of *dharma* (virtuous actions), in obtaining *artha* (wealth), and in pursuing sensual enjoyment (*kama*). According to Devahuti (1970, p.120), this involves "living life fully and busily in all its aspects, in a disciplined manner. *Artha*, the acquisition of wealth, and *kama*, enjoyment through the senses, if obtained and applied according to other laws of *dharma* will help one to attain the ultimate goal, *moksha*".

There were several ancient Indian texts of polity and Kautilya states that various works existed on this subject before his. According to most such texts, the prime concern of the King should be with *artha*. Kautilya suggests that *artha* is of prime importance because the realisation of *dharma* and *kama* depends on *artha* (cf. Devahuti, 1970, p.121). Nevertheless, Kautilya was of the view that the King (and presumably his subjects) should follow a

balanced approach. Kautilya (1961, p.12) states that “not violating righteousness and economy, he [the King] shall enjoy his desires. He shall never be devoid of happiness. He may enjoy in equal degree the three pursuits of life, charity, wealth and desire, which are interdependent upon each other. Any one of these when pursued to excess, hurts not only the other two, but also itself”. The King must also command *danda* or authority.

However, Kautilya expresses the view that the authority of the King should be exercised in a manner that promotes the happiness of his subjects and that he should actively foster the wealth of his kingdom. Kautilya (1961, p.38) advises as follows:

“In the happiness of his [the King’s] subjects lies his happiness; in their welfare his welfare; whatever pleases himself he shall not consider as good, but whatever pleases his subjects he shall consider as good.

Hence the king shall ever be and discharge his duties; the root of wealth is activity, and of evil its reverse”.

Thus, it seems that the King should serve the interests of his subjects and work actively and in a disciplined manner in that regard. This is not a philosophy of inaction. As pointed out by Devahuti (1970, p.120), *moksha* does not come from inaction; in fact, the three objects of life, the *purusharthas*, involve living life fully and busily in all its aspects, in a disciplined manner.

As will be mentioned later, one of the duties of the King, according to Kautilya, is for him to attend, for a part of each day, to the overseeing of his elephants.

It is not possible to go into the details of the polity outlined in Kautilya’s *Arthashastra*. Shamasastri’s translation of this text runs to 463 pages. It suffices to say that it is a very comprehensive document. One has to wait until Adam Smith’s *Wealth of Nations* (1950) first published in 1776, to find a comparable European work although the political economy of Kautilya has more in common with the European Mercantilists (for example, Mun, 1928, published originally in 1664) than with liberal market-dominated ideal of Adam Smith. Nevertheless, Kautilya and Adam Smith both subscribed to the view that the wealth of the nation resides in the happiness of its people rather than the wealth of the sovereign. Whereas Smith thought that this happiness could be best achieved by a system of competitive free

markets, (in which the sovereign ensured law, order and national security) Kautilya thought that active intervention of a benevolent despot was necessary to ensure this end. Elephants had an important role in helping to ensure the security of the state and in statescraft, although Ramaswamy, in his outline of Kautilya's *Arthashastra*, deletes what he describes as "archaic topics like planning of elephant forests, training of elephants in peace and war" (Ramaswamy, 1962, p.3).

3. Kautilya on the Care of Elephants

Elephants were considered so important by Kautilya that he recommended that the King set aside 1.5 hours each day (the seventh part) to "superintend elephants, horses, chariots and infantry" (Kautilya, 1961, p.37). The King is also required to undertake good management of elephant forests, from which his stock of elephants can be replenished, and to extend such forests (Kautilya, 1961, p.48).

The King should appoint a superintendent of elephants. Recommended payments of salaries for the military commander of elephants, the superintendent of elephants, and guards of elephant forests are comparatively high (see Kautilya, 1961, p.277).

The penalty for killing an elephant is death (Kautilya, 1961, p.49). Elephants were highly valued.

One reason for this is the reputed value of elephants in battle. Kautilya (1961, p.49) states:

"The victory of kings (in battles) depends mainly upon elephants; for elephants, being of large bodily frame, are capable not only to destroy the arrayed army of an enemy, his fortifications and encampments, but also to undertake works that are dangerous to life".

The superintendent of elephant forests and his guards are required to maintain the elephant forests and to be knowledgeable about their geography. With the help of others, they are required to engage in the capture of wild elephants to be tamed for the King. Kautilya (1961, p.49) describes the methods that may be used and suggests regions, such as modern day Orissa, able to provide the best elephants. However, he agrees that elephants from all regions, with proper training, can be valuable.

The superintendent of elephants is to be given wide powers to protect elephant forests and to manage the King's stabled elephants as well as to appoint and supervise personnel responsible for the care and use of elephants (Kautilya, 1961, p.151). Kautilya describes how stables for elephants should be constructed and the desirable timetable for the tamed elephants for the day; bathing, feeding, exercise, drinking, sleeping etc.

He outlines in some detail methods for the training of elephants for war and those for riding (Kautilya, 1961, pp.153-155). He recommends that young elephants and those without tusks not be captured. He, in fact, suggests that elephants be 20 years of age before they are captured. He specifies the rations for domesticated elephants (Kautilya, 1961, p.152) but one wonders if some of the rations were intended for their keepers because the rations included flesh. The rations also included liquor and curd.

The degree of respect for the elephant in ancient India is highlighted by Kautilya's list of penalties for its mistreatment, lack of respect towards it and failure to protect it. As mentioned above the death penalty was applied to those who killed an elephant. The throwing of mud, sticks, stones or similar objects at elephants or raising one's arm aggressively against it was treated as assault (Kautilya, 1961, p.262).

A man who provokes an elephant and is killed by it, shall supply for the elephant liquor, garlands, and scents, and "as much cloth as is necessary to wash the tusk; for death caused by an elephant is as meritorious as the sacred bath taken at the end of a horse-sacrifice" (Kautilya, 1961, p.263).

Furthermore, it is a crime if a person causes or lets tusked animals, such as elephants, destroy one another. Such a person "shall not only pay a fine equal to the value of the destroyed animal or animals, but also make good the loss (to the sufferer)" (Kautilya, 1961, p.263). Thus the law places the elephant in a privileged position.

4. The Elephant and War According to Kautilya

As mentioned, above, Kautilya was of the view that victory in war was likely to go to the side with the largest and best trained body of elephants. He provides details on the tasks to be

undertaken by the various components of the army (infantry, cavalry, chariots and elephants) and how these should be arrayed in battles (Kautilya, 1961, pp.397-405).

The role of the elephant in war according to Kautilya (1961, p.399) is as follows:

“Marching in the front; preparing the roads, camping grounds and path for bringing water; firm standing, fording and entering into water while crossing pools of water and ascending from them [they could form a living bridge across water]; forced entrance into impregnable places; setting or quenching the fire; the subjugation of one of the four constituents of the army; gathering the dispersed army; breaking a compact army; protection against dangers; trampling down [the enemy’s army]; frightening and driving it; magnificence; seizing; abandoning [positions]; destruction of walls, gates and towers; and carrying the treasury”.

The elephant was, therefore, an extremely versatile animal in war. It could also operate in varied terrains; a wider range than for other branches of the army. For example, the elephant corps could be effective in forested, wooded, and weedy areas, muddy soil, assailable hills and valleys, and even in dusty areas. However it could be severely impeded by the presence of some thorns which Kautilya (1961, p.398) says are known as dog’s teeth.

Kautilya presents various ways in which an army may be arrayed for attack. The array varies with the purpose and the composition of the force. However, in each case elephants have a vital role to play.

Kautilya claims (1961, p.401) that “the best army is that which consists of strong infantry and of such elephants and horses as are noted for their breed, birth, strength, youth, vitality, capacity to run even in old age, fury, skill, firmness, magnanimity, obedience and good habits”. While he suggests (1961, p.399) that a King deficient in elephants may “fill up the centre of his army with mules, camels and carts” this is clearly a poor substitute.

Elephants were undoubtedly an effective and awe-inspiring component of ancient Indian armies. “Elephants were often protected by leather armour, and their tusks tipped with metal spikes. The Chinese traveller Sung Yun, who visited the kingdom of the Hunas in the early

6th century, speaks of fighting elephants with swords fastened to their trunks with which they wrought great carnage, but there is no confirmation of this practice in other sources. As well as the mahout, the elephant usually carried two or three soldiers, armed with bows, javelins and long spears, and advanced with a small detachment of infantry to defend it from attack” (Basham, 1954, p.129).

However, technologies used in war evolve and methods to counter elephants were developed. Basham (1954, pp.129-130) believes that the Indians over-estimated the prowess of elephants in war and continued to do so even after the usefulness of elephants was outmoded. He says: “even the best trained elephant was demoralized comparatively easily, especially by fire, and when overcome by panic would infect its fellows, until a whole squadron of elephants, trumpeting in terror, would turn from the battle, throw the riders, and trample the troops of its own side. The pathetic Indian faith in the elephants fighting qualities was inherited by the Muslim conquerors, who, after a few generations in India, became almost as reliant on the elephant as the Hindus, and suffered at the hands of armies without elephants in just the same way” (Basham, 1954, pp.129-130).

The number of elephants enlisted in the armies of ancient India was quite large. The last Nanda King was reputed to have had 3,000 – 6,000 elephants in his forces and possibly Chandragupta Maurya had even more. Emperor Harsha, who reigned in Northern India 607-647 AD, was reputed by the Chinese traveller, Hsuan Tang, to have had 5,000 elephants in his army at the beginning of his career and 60,000 at his zenith (Basham, 1954, pp.131-132). Providing for the recruitment of such a large number of elephants and caring of them was undoubtedly a major administrative task of the state.

5. Concluding Comments

Thus, it can be seen that elephants were highly valued by kingdoms in India for a period of almost 2000 years as major instruments for conducting war. They also had other important use values, for example, as a means of transport, particularly in areas where roads were not well formed.

While it may have been true, as Basham (1954, pp.129-130) suggests, that the Indians over-valued elephants as war instruments and did so for too long, this at least had the side-benefit that wild elephants and their forests (which also contained other wildlife) were protected by

the King. This was to ensure him of a supply of elephants “Special forest tracts were designated as elephant preserves, inhabited by trackers, hunters and tamers, in the employ of the King. Generally the ownership of elephants was confined to Kings and chiefs, and peasants living in the vicinity of elephant forests must have cursed the depredations of these beasts, which would frequently leave the jungle to raid the clearing” (Basham, 1954, pp.195-196). Hsuan Tang, the Chinese visitor to India in the 7th century reported herds of wild elephants conserved by Kings in areas where they became extinct (Basham, 1954, p.190) during the British rule of India.

In Kautilya’s *Arthashastra*, no religious reasons nor empathetic reasons are mentioned for conserving and protecting wild elephants, although it is possible that some may have existed. One is left with the impression that the over-riding reason for conserving elephants was their usefulness to kings, particularly in war. With the end of the Indian kingdoms and the evolution of war technologies, the future of the Asian elephant in India became uncertain. While the elephant continued to be a useful animal, the British did little to conserve it and they were, in fact, instrumental in widespread destruction of elephant populations in India. For example, elephants were very valuable for clearing the estates for the British in Assam, carrying out tea and transporting planters (Moxham, 2004, p.102, p.114) Nevertheless, British planters and administrators killed large numbers of elephants for sport and for the collection of their tusks as trophies (Moxham, 2004, for example, p.170). It is now the passive use value of wild elephants for tourism and human empathy for their continuing existence that is the mainstay of support for the conservation of India’s remaining wild elephants. However, they are unlikely to be as abundant and to be conserved again on such a large scale as in ancient India.

References

- Bandara, R. and Tisdell, C. (2003). Use and non-use values of the Asian elephant. *Sri Lanka Economic Journal*, 4(2), 3-30.
- Basham, A.L. (1954). *The Wonder that was India*. Sidgwick and Jackson, London.
- Daniel, J.C. (2004). Man and elephant. *Science India*, 7(9/10): 114-115.
- Davahuti, D. (1970). *Harsha: A Political Study*. Clarendon Press, Oxford.
- Edwardes, M. (1961). *A History of India: From the Earliest Times to the Present Day*. Sidgwick and Jackson, London.

- Fleet, J.F. (1961). Introductory note. Pp.v-vi in Kautilya's *Arthasastra*, 7th edition, translated by R. Shamsastry. Mysore Printing and Publishing House, Mysore.
- Kautilya (1961). *Arthasastra*, 7th edition, translated by R. Shamasastri. Mysore Printing and Publishing House, Mysore.
- Kotchen, M.J. and Reiling, S.D. (2000). Environmental attitudes, motivation, and contingent valuation of non-use values: a case study involving endangered species. *Ecological Economics*, **32**: 93-107.
- Moxham, R. (2004). *Tea: Addiction, Exploration and Empire*. Robinson, London.
- Mun, T. (1928). *England's Treasure by Foreign Trade*. Blackwell, Oxford. First published in 1664.
- Passmore, J.A. (1974). *Man's Responsibility for Nature: Ecological Problems and Western Traditions*. Duckworth, London.
- Ramaswamy, T.N. (1962). *Essentials of Indian Statescraft: Kautilya's Arthasastra for Contemporary Readers*. Asia Publishing House, London.
- Shamasastri, R. (1961). Preface to the third edition. Pp.xxv-xxxiii in Kautilya's *Arthasastra*, 7th edition, translated by R. Shamasastri. Mysore Printing and Publishing House, Mysore.
- Smith, A. (1950). *An Enquiry into the Nature and Causes of the Wealth of Nations*, 6th edition edited by Edwin Canaan. Methuen, London.
- Swain, D. (2004). Economics of conserving elephants with special reference to the elephants of Similipal, Orissa and India. *Science India*, **7**(9/10): 58-66.
- Tisdell, C. and Bandara, R. (2004). Human societies, economics and the fate of the Asian elephant. *Science India*, **7**(9/10): 67-72.

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